

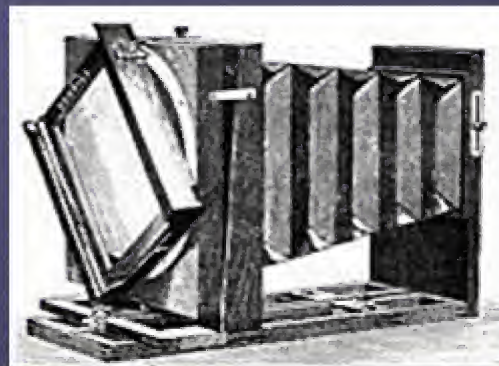
History of Remote Sensing



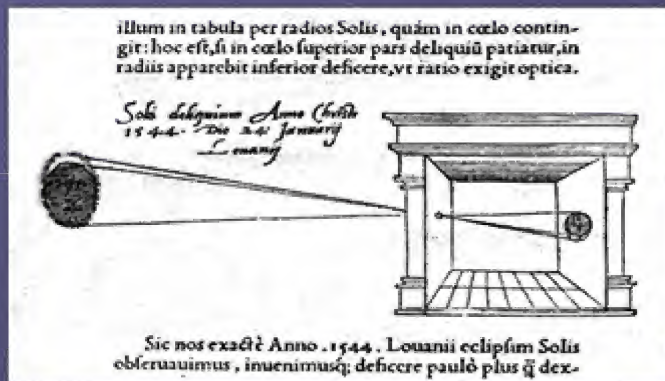
Some Important Dates in the Chronological History of Remote

Sensing

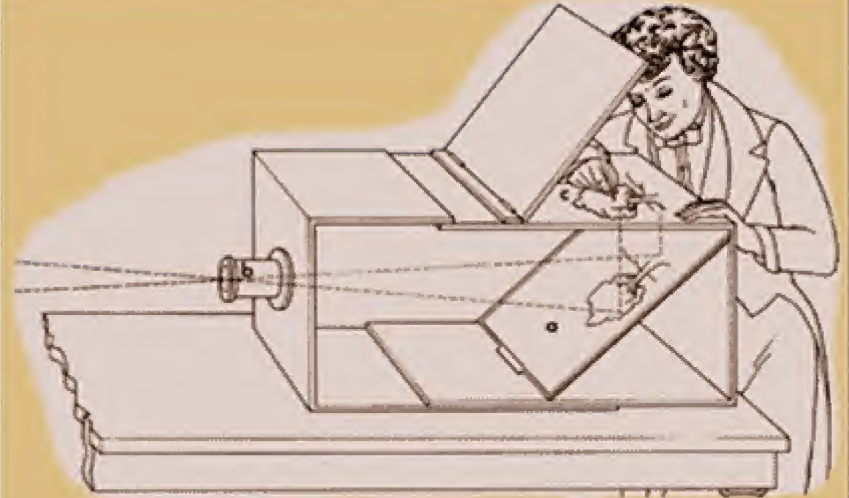
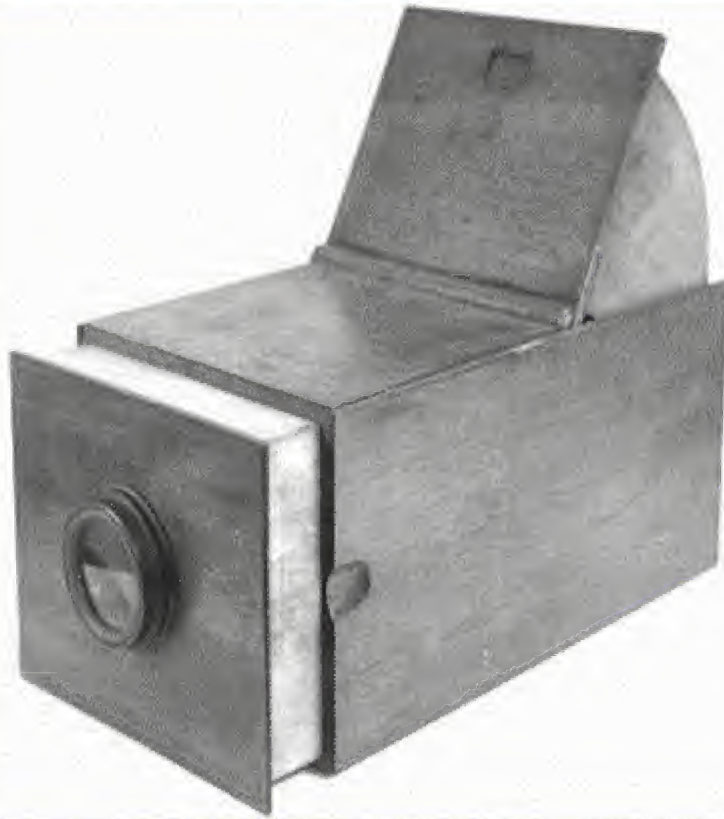
The history of remote sensing began with the invention of photography. The term "photography" is derived from two Greek words meaning "light" (phos) and "writing" (graphien).



- 1038 AD - Al Hazen
an Arabian
mathematician
explained the
principle of the camera
obscura to observe sun
eclipse.



Camera Obscura

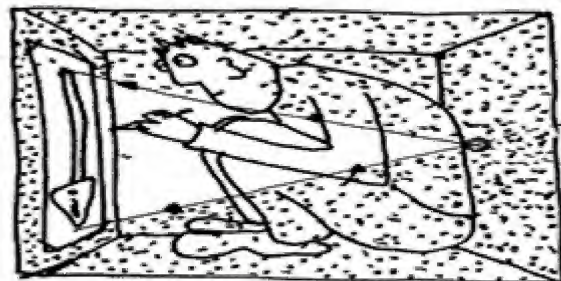


A typical camera obscura at the beginning of the 19th Century, somewhat larger than the replica shown above, incorporating a mirror (1), which directs the image from the lens onto translucent paper (c) supported on a glass plate. The double interlocking box enables focusing.

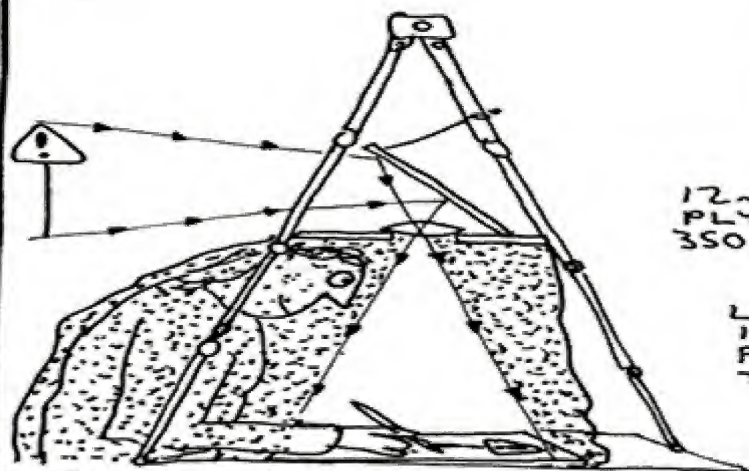
After Brian Coe, *Cameras: From Daguerrotypes to Instant Pictures* (Gothenberg, Sweden: Nordbok, New York: Crown Press, 1978), p. 2.

HOW TO MAKE A CAMERA OBSCURA

BY TIM HUNKIN



A CARDBOARD BOX WITH A HOLE IN THE SIDE MAKES A SIMPLE CAMERA OBSCURA. WITH A SMALL HOLE (3mm), THE IMAGE WILL BE VERY DIM. ENLARGING THE HOLE MAKES THE IMAGE BRIGHTER BUT NO LONGER IN FOCUS. TO CREATE A BRIGHT, SHARP IMAGE A LENS IS NEEDED INSTEAD OF A PINHOLE.

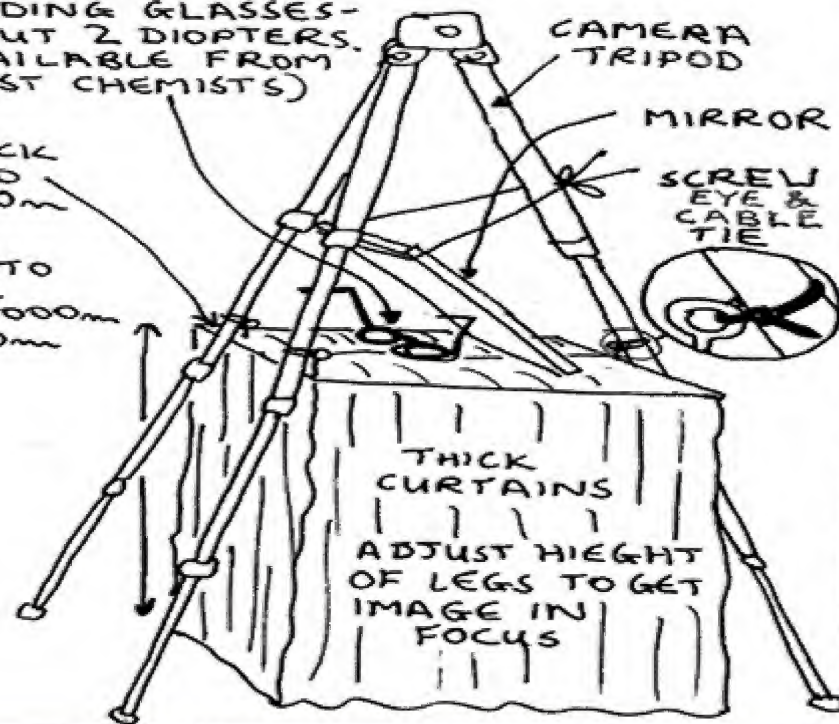


THIS OBSCURA USES A CAMERA TRIPOD. EVERYTHING MUST BE RIGIDLY FIXED OR THE IMAGE WILL WOBBLE ABOUT WHILE DRAWING. THE CURTAINS NEED TO BE LARGE ENOUGH TO KEEP OUT THE LIGHT WHEN A PERSON IS UNDERNEATH.

READING GLASSES - ABOUT 2 DIOPTERS. (AVAILABLE FROM MOST CHEMISTS)

12mm THICK PLYWOOD 350mm x 350mm

LENS TO IMAGE FROM 1000mm TO 500mm



CAMERA TRIPOD

MIRROR

SCREW EYE & CABLE TIE

THICK CURTAINS

ADJUST HIEGHT OF LEGS TO GET IMAGE IN FOCUS

- 1490 - Leonardo da Vinci describes in detail the principles underlying the *CAMERA OBSCURA* (literally *DARK ROOM*).
- 1550- Cirolama Cardano first put optic on camera obscura for creating more quality image.
- 1614 - Angelo Sala discovers that silver salts darken when exposed to sunlight.

- 1666 - Sir Isaac Newton, while experimenting with a prism, found that he could disperse light into a spectrum of red, orange, yellow, green, blue, indigo, and violet. Utilizing a second prism, he found that he could re-combine the colors into white light.
- 1676 - Johann Christopher Sturm, introduces the relax lens principle where by a mirror is mounted at a 45 degree angle that projects an image, the essential development that led to the modern single lens reflex camera.

- 1777 - Carl Wilhelm Scheele, discovers that silver chromate darkened by exposure to sunlight could be rinsed off with ammonia leaving the dark unexposed silver chromate crystals to form a "fixed" image, a precursor to modern photographic film.
- 1800 - Sir William Herschel, measures the temperatures of light split with a prism into the spectrum of visible colors. He had discovered *thermal infrared electromagnetic radiation*.
- 1827 - Niepce takes *first picture* of nature from a window view of the French countryside using a camera obscura and an emulsion using bitumen of Judea, a resinous substance, and oil of lavender (it took 8 hours in bright sunlight to produce the image)

First photograph in the world by Niepce



- 1839 - Daguerre announces the invention of Daguerrotype which consisted of a polished silver plate, mercury vapors and sodium thiosulfate ("hypo") that was used to fix the image and make it permanent.
- 1839 - William Henry Fox Talbot invents a system of imaging on silver nitrate or silver chromate treated paper and using a fixative solution of sodium chloride.

1830's - The invention of stereoscopes

- The pictures used in the stereo views were in the form of "stereographs" which were two pictures of the same scene that were slightly offset and mounted side-by-side.

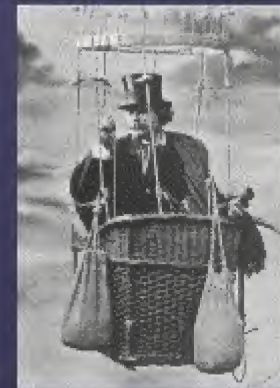
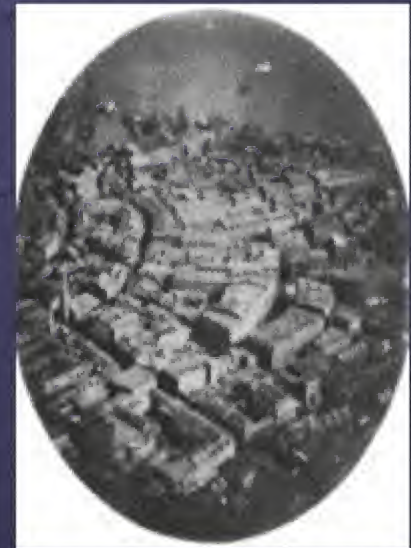
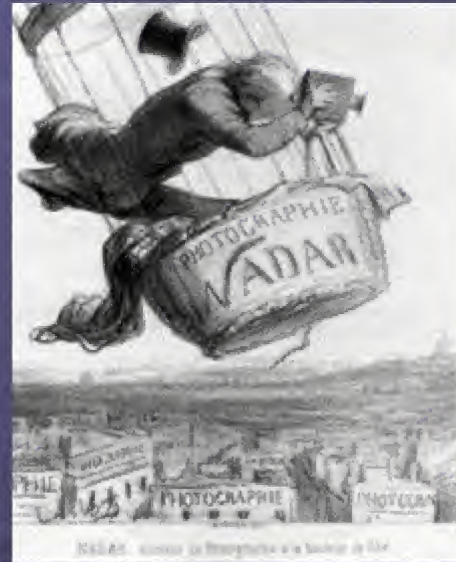


Old-fashioned parlor stereoscope (the stereopticon). Note paired photographs of the Sphinx. (Courtesy Keystone View Co.)

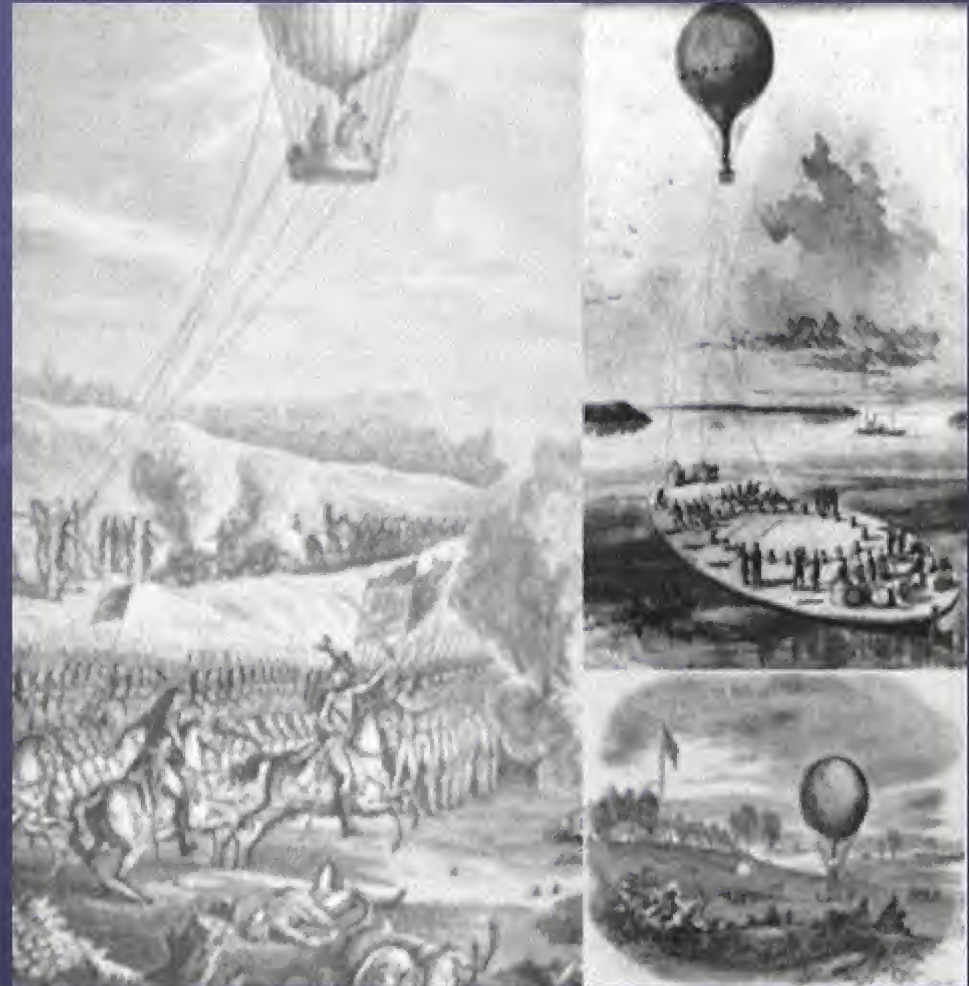
1855– James Clerk
Maxwell, describes
color additive theory.
The color additive
theory describes how
we perceive color and
how they are created.



- 1858 - Gaspar Felix Tournachon "**Nadar**" takes the first aerial photograph from a captive balloon from an altitude of 1,200 feet over Paris.



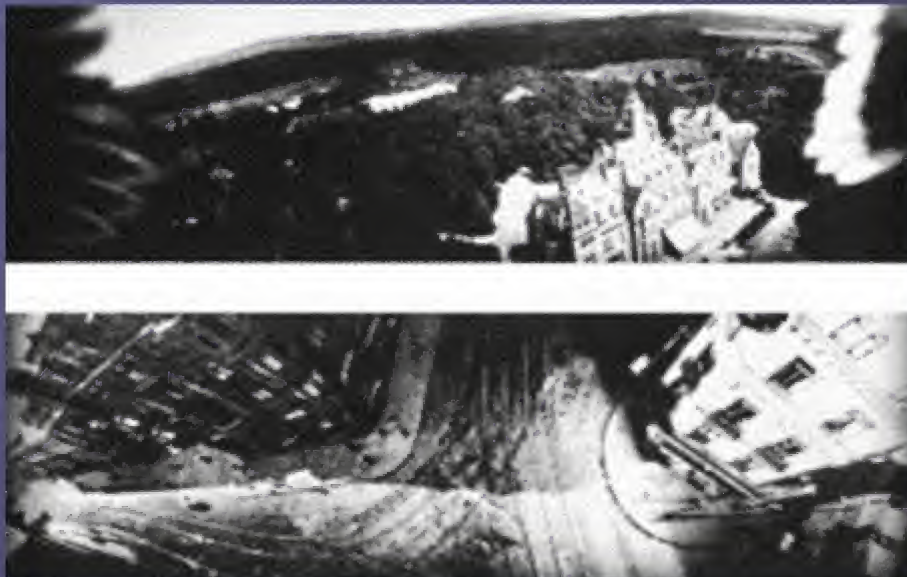
- 1860's - Aerial observations, and possible photography, for military purposes were acquired from balloons in the Civil War. Balloons were used to map forest in 1862, but not used to acquire aerial photographs as far as scholars can tell



- 1873 - Herman Vogel discovered that by soaking silver halide emulsions (sensitive to blue light) in various dyes, that he could extend their sensitivity to progressively longer wavelengths, this discovery led to near infrared sensitive films.
- 1887 - Germans began experiments with aerial photographs and photogrammetric techniques for measuring features and areas in forests.
- 1889 - Arthur Batut took **the first aerial photograph** from using a kite of La Bruyère France.

- 1899 - George Eastman produced a nitro-cellulose based film type that retained the clarity of the glass plates which were in use at the time and introduced the first **Kodak camera**.
- 1900 - Max Planck's revelation of '**quanta**' and the mathematical description of the '**black body**' lays the foundation for numerous developments in quantum mechanics.

- 1903 - The Bavarian Pigeon Corps uses pigeons to transmit messages and take aerial photos.



- 1906 - [Albert Maul](#), using a rocket propelled by compressed air, took an aerial photograph from a height of 2,600 feet, the camera was ejected and parachuted back to earth.
- 1906 - [G.R. Lawrence](#) who had been experimenting with cameras which were hoisted into the air with the aid of balloon kites.
- 1907 - [Auguste and Louis Lumiere](#), two French brothers develop a simple color photography system and establish the 35 mm standard.

1914 - WWI provided a boost in the use of aerial photography, but after the war, enthusiasm waned

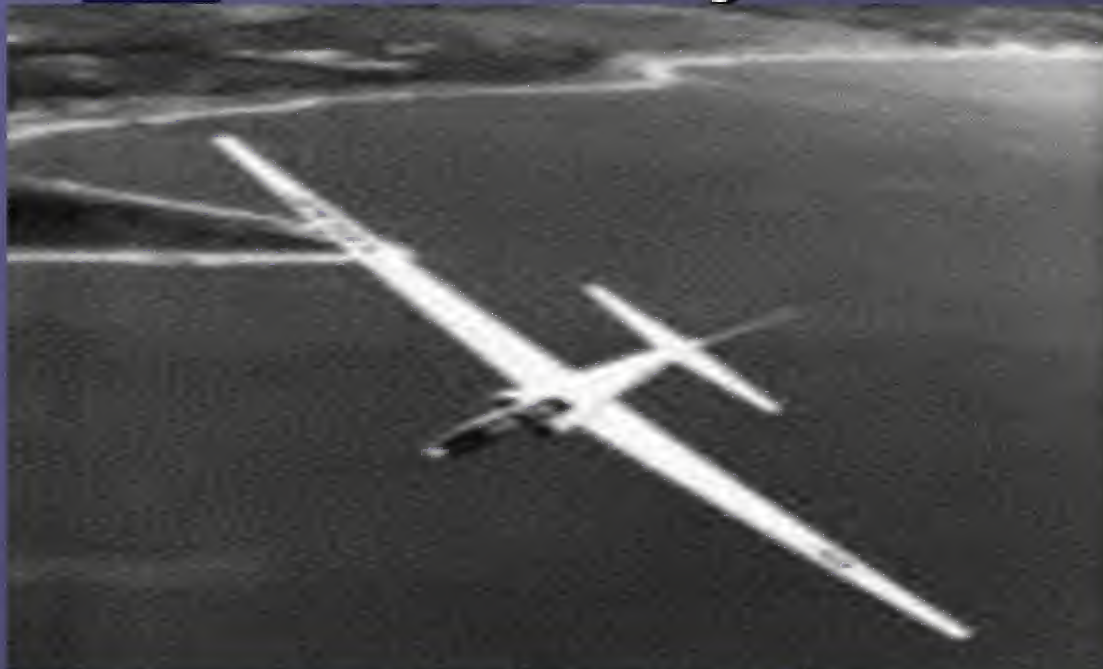


1934 - Photogrammetric Engineering first published. American Society of Photogrammetry founded and renamed *Photogrammetric Engineering and Remote Sensing*. The Society was again renamed, and is now *The American Society of Photogrammetry and Remote Sensing*.

- 1936 - Albert W. Stevens takes the first photograph of the actual curvature of the earth - taken from a free balloon at an altitude of 72,000 feet.
- 1938 - A German General Werner von Fritsch, made a prophetic statement at this time said: "The nation with the best photo reconnaissance will win the next war!!"
- 1940 - World War II brought about more sophisticated techniques in air photo interpretation.

1946 - First space photographs from V-2 rockets.

1954 - U-2 takes first flight.

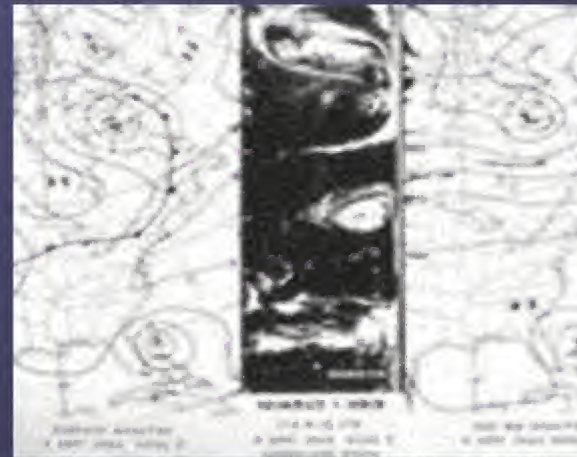


1957 - Russia
launches Sputnik-1,
this was unexpected
and encouraged our
government to make
space exploration a
priority.



- 1960 - TIROS-1 launched as first meteorological satellite.
- 1960 - U-2 is "shot down" over Sverdlovsk, USSR.
- 1960's - US begins collection of intelligence photography from Earth orbiting satellites, CORONA.

- 1962 - Zaitor and Tsuprun construct prototype **nine lens multispektral camera**
- 1963 - D. Gregg, creates "**videodisk**"
- 1964- Nimbus Weather Satellite Program begins with the Launch of **Nimbus1**.



- Late 1960's - Gemini and Apollo Space photography.



- 1972 - Launch of ERTS-1 (the first Earth Resources Technology Satellite ,later renamed Landsat 1).
- 1972 - Photography from Skylab, America's first space station, was used to produce land use maps.
- 1975 - Landsat 2, GOES
- 1977 - Meteosat-1 the first in a long series of European weather satellites
- 1978 - Landsat 3
- 1978 - Seasat, the first civil Synthetic Aperture Radar (SAR) satellite.

- 1978 - Launch of Nimbus-7 with Total Ozone Mapping Sensor (TOMS) and the Coastal Zone Color Scanner (CZCS), GOES-3.
- 1981 - Space-Shuttle Imaging Radar (SIR-A), Meteosat-2
- 1982 - Landsat-4
- 1984 - SIR-B
- 1984 - Landsat-5
- 1986 - SPOT-1

- 1986 - Launch of SPOT-1
- 1988 - IRS-1A, Meteosat 3, Ofeq-1
- 1989 - Meteosat-4, Ofeq-2
- 1990 - SPOT-2
- 1991 - ERS (European Radar Satellite), IRS-1B, Meteosat-5.
- 1992 - JERS-1, Topex/Poseidon.
- 1993 - SPOT-3, Landsat-6 fails to achieve orbit, Meteosat-6
- 1994 - SIR-C/X-SAR flies on the space shuttle.

- 1995 - Launch of OrbView-1, ERS-2, Radarsat-1, IRS-1C, Ofeq-3 fails.
- 1995 - KH-12 spy satellite
- 1996 - Launch of IRS-P3, SPOT-3 fails
- 1997 - Orbview-2 with SeaWiFS, GOES-10, DMSP-5D, Adeos-1 satellite fails after 8 months of operation, IRS-1D, Meteosat-7, Lewis fails 3 days after launch, Earlybird fails 4 days after launch.
- 1998 - Launch of SPOT-4, SPIN-2, JERS-1

- 1999 - Launch of Landsat 7, IKONOS, IRS-P4, QuickSCAT, CBERS-1, Terra, MODIS, ASTER, CERES, MISR, MOPITT, Kompsat 1.
- 2000 - SRTM (China), Tsinghau-1 , EROS A1 (Israel) , Jason-1
- 2001- Quickbird
- 2002 - Aqua, SPOT-5, ENVISAT, METSAT, Alsat-1, Meteosat Second Generation, ADEOS-II, Ofeq-5

- 2003 - Launch of ICESat, Orbview-3
- 2003 – Launch of ALOS (Advanced Land Observation Satellite) Japan
- 2003 – Launch Radarsat-2 (CANADA),
CBERS-2 (China).

DMC BilSat (TURKEY)

DMC NigeriaSat-1 (Nigeria)

DMC UK (UK)

- 2004 - China Satellite RocSat2 launched.
- 2005 - Launch of TopSat, a micro-satellite, with 2.5 m resolution and the ability to relay imagery to receiving stations within the safe image footprint.
- 2005 - Google Inc. releases Keyhole, <http://earth.google.com>, greatly increasing public awareness of the uses of satellite imagery and other geospatial information.

Google earth



2007 – Expected launch of RapidEye...